

CLAIMS

What is claimed is:

1 1. A resonator device configured with an input port at one end and a
2 termination at its other end, and for providing a frequency selective element for an
3 oscillator, the device comprising:

4 a substrate; and

5 a fractional wavelength transmission line on a surface of the substrate, and formed
6 into one or more loops thereby providing a looped-stub resonator structure,
7 wherein each edge or side of the one or more loops provides a portion of the
8 fractional wavelength.

1 2. The device of claim 1 wherein the termination is one of a capacitor, a short
2 circuit, or an open circuit.

1 3. The device of claim 1 wherein the device is a structure having a number of
2 layers, and the transmission line is located in an inner layer of the structure.

1 4. The device of claim 3 wherein the inner layer is substantially surrounded by
2 dielectric insulating material layers.

1 5. The device of claim 4 wherein electrically conducting material layers
2 connected to ground surround the dielectric insulating material layers.

1 6. The device of claim 1 wherein the device is incorporated into a voltage
2 controlled oscillator of a phase locked loop circuit.

1 7. The device of claim 1 wherein the looped-stub resonator is a metal pattern
2 formed on the substrate, and changes in oscillation frequency are accomplished by
3 physically changing the metal pattern.

1 8. The device of claim 1 wherein the looped-stub resonator is formed on the
2 substrate as a metal pattern that includes a capacitive termination, and changes in
3 oscillation frequency are accomplished by physically changing the capacitive termination.

1 9. A phase locked loop module comprising:

2 a voltage controlled oscillator circuit; and

3 a fractional wavelength looped-stub resonator operatively coupled to the voltage
4 controlled oscillator circuit and having one or more loops, with each edge or
5 side of the one or more loops providing a portion of the fractional
6 wavelength, the resonator for providing a frequency selective element for
7 the voltage controlled oscillator circuit.

1 10. The module of claim 9 wherein the looped-stub resonator has a Q of 100 or
2 greater.

1 11. The module of claim 9 wherein the voltage controlled oscillator circuit and
2 the looped-stub resonator are located on a common substrate.

1 12. The module of claim 9 wherein the voltage controlled oscillator circuit and
2 the looped-stub resonator are located on different substrates.

1 13. The module of claim 9 wherein the module includes a number of layers and
2 the looped-stub resonator is located on a layer that is above a dielectric insulation layer.

1 14. The module of claim 13 wherein the dielectric insulation layer is located
2 above an electrically conducting material layer that is connected to ground.

1 15. The module of claim 9 wherein the looped-stub resonator is terminated with
2 one of a capacitor, a short circuit, or an open circuit.

1 16. The module of claim 9 wherein the looped-stub resonator is a metal pattern
2 on a substrate, and changes in oscillation frequency are accomplished by physically
3 changing the metal pattern.

1 17. The module of claim 9 wherein the looped-stub resonator is on a substrate
2 as a metal pattern that includes a capacitive termination, and changes in oscillation
3 frequency are accomplished by physically changing the capacitive termination.

1 18. The module of claim 9 wherein the looped-stub resonator has a resonant
2 frequency higher than an output frequency of the module.

1 19. The module of claim 18 wherein one or more frequency dividers are used to
2 reduce the resonant frequency to the output frequency.

1 20. A phase locked loop module comprising: ~
2 a first layer having a voltage controlled oscillator circuit;
3 a second layer of dielectric insulating material covered with a conducting metal that
4 is connected to a ground plane;
5 a third layer having a fractional wavelength looped-stub resonator operatively
6 coupled to the voltage controlled oscillator circuit and having one or more
7 loops, with each edge or side of the one or more loops providing a portion
8 of the fractional wavelength, the resonator for providing a frequency
9 selective element for the voltage controlled oscillator circuit; and
10 a fourth layer of dielectric insulating material covered with a conducting metal that
11 is connected to the ground plane;
12 wherein the third layer is surrounded by the dielectric insulating material of the
13 second and fourth layers.

1 21. The module of claim 20 further comprising:
2 an additional layer of dielectric insulating material on the conducting metal of the
3 second layer to prevent unintended short-circuiting between the first layer
4 and the second layer.

1 ~ 22. The module of claim 20 wherein the looped-stub resonator has a resonant
2 frequency higher than an output frequency of the module.

- 1 23. The module of claim 22 wherein one or more frequency dividers are used to
2 reduce the resonant frequency to the output frequency.